

A Comparative Study to Assess the Accuracy of Diagnostic Focussed Abdominal Sonography for Trauma (FAST) In Blunt Abdominal Trauma

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ABSTRACT

Background and Objective: In view of increasing number of vehicular accidents and blunt abdominal injury and its lethal & fatal complications, FAST is an essential and necessary component of trauma management. Hence this study is undertaken. The objectives of our study were to assess the diagnostic accuracy of focussed Abdominal sonography for Trauma in the detection of intra-abdominal free fluid following blunt abdominal injury.

Methods: KLE's Dr. Prabhakar Kore Hospital and Medical Research Centre, Belgaum, affiliated to KLE University, admits all the victims of Blunt Abdominal Trauma. 50 consecutive patients with history of blunt abdominal trauma attending or taken to KLE's Hospital from 01/01/2007 to 31/12/2007, were included in the Study. All the 50 patients underwent FAST protocol examination for evidence of intra-abdominal free fluid. Patients were grouped into 2 categories based on presence of free fluid (FAST +) and absence of free fluid (FAST -). FAST findings were compared with gold standards like laparotomy findings and in conservatively treated patients, with CT Scan findings. Statistical analysis was done by calculating Sensitivity and Specificity.

Results: 50 patients with history of BAT were included in the study, out of which 36 were male and 14 were female. Most of the patients were in the age group of 20-40 years (age range: 4 -75 years). 35 patients presented with hypotension. FAST findings were positive in 38 patients and negative in 12 patients. 34 patients underwent laparotomy and 16 patients were treated conservatively. Specificity of FAST was 100% in comparison with laparotomy findings and 60% when compared to CT Scan findings. The Sensitivity was 84% in comparison with laparotomy findings and 72% when compared to CT Scan findings.

Conclusion: We conclude that the advantages of FAST Protocol are that it is harmless, non-invasive rapid, portable, accurate, repeatable and can be performed during resuscitation. It does not prejudice other investigations especially in hemodynamically unstable patients.

KEY WORDS: Blunt Abdominal Trauma, Focussed Abdominal Sonography, Ultrasonography.

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INTRODUCTION

FAST (Focussed Abdominal Sonography for Trauma) or focussed assessment with sonography in trauma is an emergency Ultra

sound investigation, performed by the surgeon for the patients with Blunt Abdominal Trauma. The use of diagnostic ultrasonography

(US) to evaluate the blunt trauma victim for abdominal injuries has been advocated since the 1970s. But it was not until the 1990s that surgeon performed abdominal US for trauma was first reported. Since then, numerous studies have demonstrated the utility and advantages of using abdominal US in the initial work-up of the blunt trauma patient. Accordingly, interest in this technology has developed among surgeons and emergency physicians. FAST relies on the detection of free fluid either haemoperitoneum or gastro-intestinal contents to identify patients with injury. To date, many studies of abdominal US have been inconclusive for several reasons, including the frequent lack of a gold standard test, the inclusion of both penetrating and blunt injuries, the use of small sample sizes, and the study of patients with a low severity of injury. Therefore, a more definitive evaluation of FAST was required and formed the impetus for this study [1,2].

MATERIALS AND METHODS

KLE's Dr.Prabhakar kore Hospital and Medical Research Centre , Belgaum, affiliated to KLE University , admits all the victims of Trauma, which includes patients with blunt abdominal injury.

Patients with history of blunt abdominal trauma attending or taken to KLE's Prabhakar kore Hospital and MRC Belgaum from 01/01/2007 to 31/12/2007 were included in the study. A verbal consent was taken from the conscious patients and unconscious patients directly entered the study without any consent or the patients attender's consent. The sample size is taken from 80% of the cases who had presented with history of Blunt Abdominal Trauma to K.L.E Hospital in previous consecutive 3 years. And the sample size was calculated to be 50. All the consecutive patients presenting with history of blunt abdominal trauma were included in the study. Inclusion and Exclusion criteria for including or excluding the patients in the study were defined and were applied to the patients. Fig.1 shows different probe positions for FAST Scan. Fig.2 shows normal Perihepatic FAST. Fig.3 shows Positive or abnormal Perihepatic FAST.

Source of Data: 50 consecutive patients presented with history of blunt abdominal

trauma to KLE's Prabhakar Kore Hospital and MRC , Belgaum based on comprehensive history and physical examination, subjected to FAST Examination and later taken up for surgery or managed conservatively.

Sample size: 50 patients with history of blunt abdominal trauma.

Inclusion criteria:

1. Patients presenting with history of blunt injury to abdomen were included.
2. Patients with history of Blunt Abdominal Trauma associated with non-abdominal injuries (polytrauma) were also included.

Certain patients in whom some adverse factors, which affect the view quality of ultrasonography, and influence the outcome of results were excluded from the study.

Exclusion criteria:

1. Known cases of ascites.
2. Previous history of liver abscess or any other intra-abdominal abscess/cysts.
3. Post-operative cases (≤ 3 months).
4. Pregnant women.

RESULTS

50 patients with history of blunt abdominal injury were included in the study, conducted from 01-01-2007 to 31-12-2007 ,out of which 36 were male and 14 were female. Most of the patients were in the age group of 20-40 years (age range : 4 -75 years). RTA was the most common mechanism of trauma seen in 35 patients. 35 patients presented with hypotension and haemodynamic instability (Table.1).

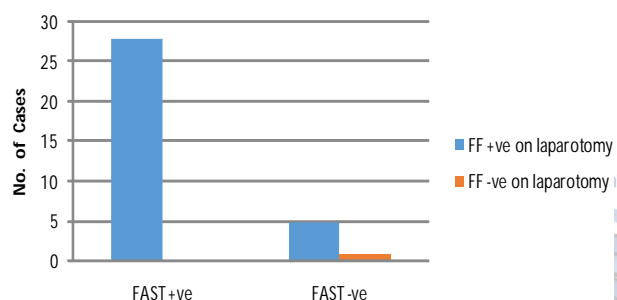
FAST findings were positive in 38 patients and negative in 12 patients. 34 patients underwent laparotomy and 16 patients were treated conservatively. Out of 34 patients who underwent laparotomy, 28 patients were FAST Positive and 6 were FAST Negative (Graph 1). All 28 patients had significant intra abdominal injury & among 6 FAST Negatives, 5 patients had injuries and 1 patient did not have any injuries (True Negative). Splenic injury was the most common organ injury. Among 16 conservatively treated patients 10 were FAST Positive & 6 were FAST Negative. Out of 10 FAST Positives 8 patients had injuries & 2 patients had no injuries.

Table 1: Demographics of Patients.

Age (yrs) - 4 -75 yrs
Sex- M:36 , F:14
Mechanism of Trauma - RTA - 35, Assault - 7, Fall From Height - 8
Hypotension at admission - 35 pt.s.

Out of 6 FAST Negatives 3 patients had injuries and 3 patients had no injuries (Graph 2). Average time taken for each FAST Scan was 7 minutes.

Graph 1: FAST examination observation in detecting free fluid in abdomen in comparison with intra operative findings.



Graph 2: FAST examination observation in detecting free fluid in abdomen in comparison with CT Scan findings.

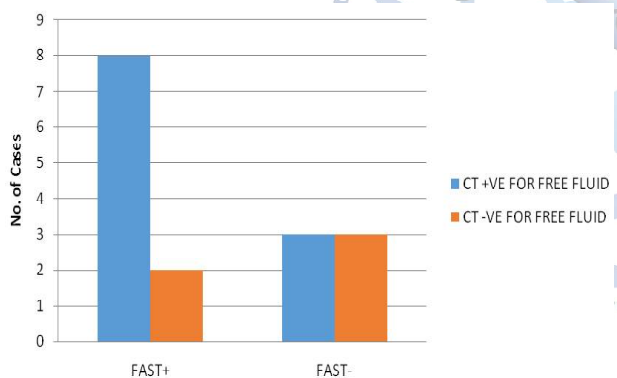
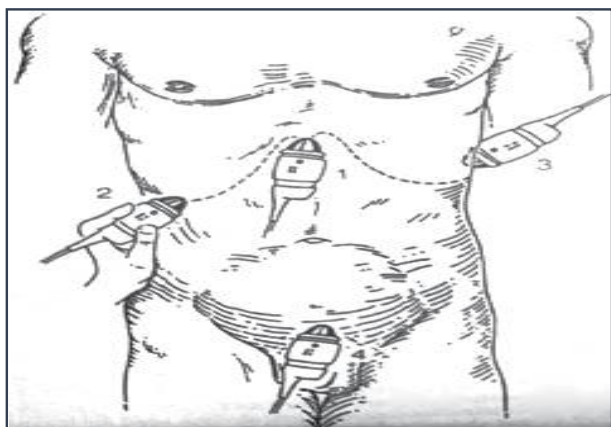


Fig 1: The four Scanning windows / probe positions for the FAST examination.



1. pericardial
2. perihepatic
3. perisplenic
4. pelvic

Specificity of FAST was 100% in comparison with laparotomy findings and 60% when compared to CT Scan findings. The Sensitivity was 84% in comparison with laparotomy findings and 72% when compared to CT Scan findings. FAST had a positive predictive value of 100% and 80% in comparison with laparotomy and CT Scan findings respectively. The negative predictive value of FAST was found to be 16% and 50% in comparison with laparotomy and CT Scan findings respectively.

Fig. 2: Normal perihepatic FAST

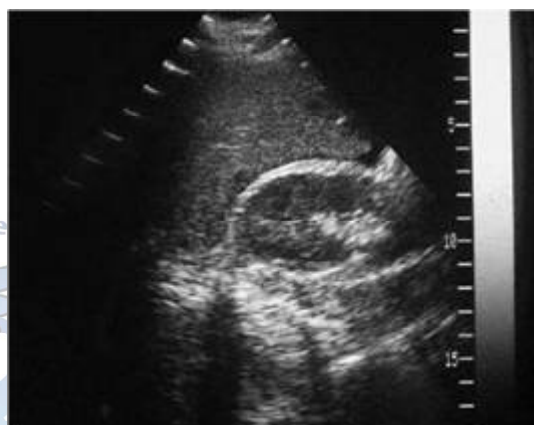
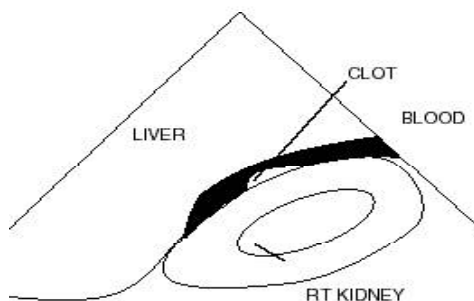
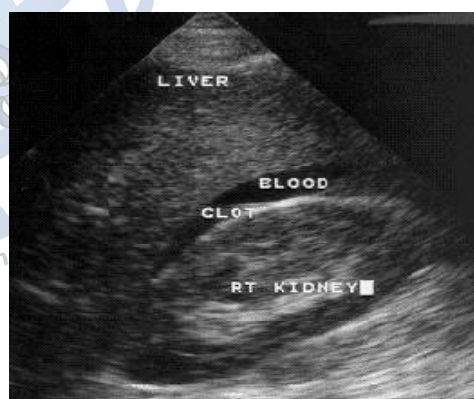


Fig. 3: Abnormal or positive hepatorenal FAST.



DISCUSSION

Clinical abdominal examination is inaccurate for the assessment of the blunt trauma patient as there are often distracting injuries, altered levels of consciousness, nonspecific signs and

symptoms and large differences in individual patient reactions to intra-abdominal injury [3]. Thus, diagnostic tests must be selected, performed and interpreted to reliably discriminate between patients who require therapeutic intervention or further study from those who do not. Quick ultra sonographic screening to identify the presence of free intraperitoneal and intrapericardial fluid constitutes focused abdominal sonography for trauma (FAST) examination, which is becoming the clinical standard [4]. The most important benefits of this technique are an earlier and portable means of confirming the presence of intracavity hemorrhage or visceral leakage [5]. Boulanger and associates reported in 2000 that FAST had replaced diagnostic peritoneal lavage as the initial screening test after blunt abdominal trauma in the majority of North American trauma centers[6]. The goal of FAST examination, as defined by a recent international consensus conference, is to detect free intraperitoneal fluid as a marker of injury. In current practice, FAST has taken on 2 congruous yet distinct roles. One is the early identification of unstable trauma victims requiring urgent surgical intervention, and the other newer, potentially controversial, role is that of excluding stable patients from further abdominal imaging [7]. Institutional trauma protocols at many trauma centers have accepted FAST's ability to do both; thus, unstable patients with positive FAST results are operated on, and stable patients with negative FAST results tend to be observed, depending on the US findings and clinical examination. In one study, authors examined the validity of this practice and evaluated the role of HHFAST (Hand Held FAST). Portable hand-held (HH) ultrasonography (US) units have recently become available to clinicians. These units were developed through a joint civilian–military initiative to provide portable US capability suitable for the battlefield or a mass casualty situation [8].

In 3 studies, as a decision making tool for the need for laparotomy in hypotensive patients (BP <90 systolic), FAST had a sensitivity of 100%, specificity of 96% and a negative predictive value of 100% (Wherret et al., Rozycki et al., McKenny et al.) In the detection of free intra- abdominal

fluid when compared to a reference standard such as DPL/CT or laparotomy, FAST had a sensitivity of 75%, a specificity of 98% and a negative predictive value of 98%(18 studies, 6324 patients, 1992 to 2000)[9-11]. The minimum amount of fluid that can be detected is 70 – 250mls depending on the study [12]. Minimum standards for training have been released by many groups. The number of scans for official verification programs can be greater than 300 in some centres, but a minimum of 25 scans should be gained before “flying solo”. A recent study of surgeons who underwent an 8 hour training program attained an accuracy rate of 90%in their FAST examinations. Interestingly, studies have shown that the longer the training programme, the better the accuracy of candidates' FAST skills [13,14].

CONCLUSION

In our study we noted that the most common cause or mechanism of trauma causing blunt abdominal injury was Road Traffic Accidents. Males were more commonly affected. The average time taken for FAST Examination was 7minutes. Most of the patients presented with pain abdomen and hypotension. Splenic injury was the most common organ injury. We conclude that the advantages of FAST Protocol are that it is harmless, non-invasive rapid , portable, accurate, repeatable and can be performed during resuscitation. It does not prejudice other investigations especially in hemodynamically unstable patients. Patients with FAST Positive & haemodynamic instability should be considered for urgent surgical intervention.

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